

The Impact of Frontline Community Health Workers on Vaccine Hesitancy in Rural Bihar

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Abstract: Despite advances in vaccine access and availability, vaccine hesitancy remains a significant barrier to vaccine coverage, particularly in low-income and socially excluded communities globally. The rural population in Bihar, India, is dealing with several public health challenges, such as inadequate access to health services, geographic isolation, social and religious disparities, and misinformation about vaccines. A lack of a robust and cohesive health-care system further exacerbates these challenges. Community Health Workers (CHWs) such as Accredited Social Health Activists (ASHAs), Auxiliary Nurse Midwives (ANMs) and Anganwadi Workers (AWWs) are an important link between rural communities and the formal health care system, as well as a source of trust in immunization services in such settings. This review will assess the effectiveness of the intervention Community Health Workers (CHWs) can bring to address vaccine hesitancy in rural Bihar, and consider how these barriers can be addressed and overcome. Long-term studies reveal that targeted community-based engagement efforts by frontline female health workers have resulted in substantial changes in vaccination coverage in certain communities, rising from nearly 12% to 84% over a span of 10 years (UNICEF, 2024). Despite these achievements, CHWs have faced several difficulties, including insufficient training, workloads along with lack of support in Adverse Events Following Immunization (AEFI). It highlights social, cultural and institutional factors influencing vaccine uptake, identifies communication strategies used by CHWs to build trust within communities and examines some recent innovations such as local microplanning and visual counseling tools. It also suggests recommendations for action that will improve grassroots health delivery and the performance of citizens in immunization in rural area.

Keywords: Vaccine Hesitancy, Community Health Workers (CHWs), Rural Bihar, Immunization Coverage, Adverse Events Following Immunization (AEFI)

1. Introduction

One of the major goals of the global public healthcare systems has been achieving universal childhood immunization. Ensuring accessibility and coverage of vaccines has been a concern in India and ample efforts has been put in place under the Universal Immunization Programme (UIP). Despite these investments, however, there are significant inequities in immunizations between regions and communities. Bihar, which is extremely rural and one of the most populated states in India, is important for the understanding of these challenges [1]. For a long time, the state has had problems with low immunization rates because of a variety of interconnected factors including geographical isolation, low maternal education level, socio-religious differences, poverty and the entrenched mistrust of public health institutions [2]. Vaccine hesitancy, as described by the World Health Organization (WHO) as when

a person delays or refuses a vaccination when it is offered, is a complex phenomenon that varies across communities, regions and countries. Family and community decisions on vaccination are not always at the individual level in a rural setting in Bihar. Social beliefs, fear of minor side effects, false information, low health awareness, and lack of clear and trustworthy communication all contribute to fear and hesitation about vaccines. The Indian government's main strategy to address vaccine hesitancy and low immunization rates is to leverage its female Community Health Workers (CHWs). They are front line workers, a multi-layered system of grassroots linking rural communities to public health services. The network mainly consists of three key groups: Accredited Social Health Activists (ASHAs): ASHAs are community-based female health workers who serve as the vital link between rural households and the public healthcare system. They are an important part in awareness creation, mobilization of families for immunization and the creation of trust in the communities. Anganwadi Workers (AWWs): In the field of Integrated Child Development Services (ICDS), AWWs work on maternal and child nutrition, preschool education and community services for health. They also support with organizing village level health and immunization related activities. Auxiliary Nurse Midwives (ANMs): ANM is a trained front line healthcare worker who provides basic primary healthcare services such as vaccines during routine immunization sessions, antenatal care and maternal health support. These Community Health Workers form the backbone of the healthcare system in rural areas and are important for improving immunization coverage in remote and neglected areas such as Bihar.

2. Socio-Demographic Drivers of Vaccine Hesitancy in Rural Bihar

There are various factors related to vaccine hesitancy in Bihar, with certain factors interacting with one another in the rural and semi-urban communities. These include a lack of education awareness, misinformation, poor communication with healthcare services, and previous healthcare experience [3]. Social beliefs and community influences play a significant role in vaccination decisions as well. Often, the uncertainty about side effects and the lack of trust in public institutions also discourage vaccination. In such challenging surroundings, Community Health Workers (CHWs) serve as a vital link between health care systems and the community. The effectiveness of these will need to be understood in terms of the complex socio-cultural context in which they operate. Their involvement is not just limited to service delivery, but also involves the creation of trust, awareness, and community involvement.

2.1 Maternal Literacy and Gendered Dynamics

Research consistently has identified that the education of mothers is a significant factor in their likelihood of ensuring that their children are immunized on time. Parents with less education are less likely to be prepared for vaccines, primarily because they don't have equal access to accurate health information or are more susceptible to rumors, fear, and misinformation. A significant difference in vaccine hesitancy between parents with less than high school education and higher educational attainment was seen by Sharan (2025) [3]. Families in many rural communities are uncertain and fearful about vaccines because they lack understanding of how vaccines work and their possible side effects.

Traditional patriarchal norms in rural Bihar also influence household-level healthcare choices, in addition to educational barriers. While mothers tend to be the main ones responsible for taking their children to immunization sessions and caring for them, they do not have the final say on health-care decisions. Decisions to spending treatment costs, travelling to health centers or accepting vaccination are often determined by fathers or older members of the family, especially grandmothers of the father. UNICEF [1] also highlights that fathers tend to have less access to health providers, resulting in a limited

understanding of the benefits of immunization and its access. Therefore, the worries of family members associated with cost or social opinion, or vaccine safety fears may be just as dominant as the belief in vaccination.

2.2 Fear of Adverse Events Following Immunization (AEFI)

The visible side effects that children might have after vaccination, like fever or swelling or temporary irritability, is one of the strongest reasons for vaccine hesitancy in rural Bihar. These reactions are typically mild and brief but many parents perceive that these reactions have injured the child and not protected him or her. Based on the research of Sharan [3], parents who have concerns about the side effects of vaccines are more likely to delay or refuse vaccination than parents who do not have concerns about vaccination side effects. Many families in Bihar's rural economy rely on agriculture or daily labour to make a living; a child's illness – even for a short time – can cause major problems for the family. Frequently, when a child presents with fever and/or discomfort after vaccination, the parent (typically mother) has to stay home to care for the child, often at the expense of missing a day's work or unable to do household and farm work [4]. This temporary setback can be a strain for economically disadvantaged families. Thus, parents might become wary and resistant to the next booster shot because they think that their children are becoming weak, ill or crying constantly after the shots.

2.3 The Spread of Digital Misinformation and Social Norms

Accessing and sharing information about health in rural India has changed with the proliferation of inexpensive smartphones and inexpensive internet. In today's rural Bihar, there is a heavy dependence on WhatsApp groups, Facebook posts, YouTube videos and conversations in neighboring social circles for health-related information—especially on vaccines. In some places digital access has made them aware, but it has also given rise to misinformation, rumors and fear spreading rapidly among communities. Research by Sharan [3] shows that families who mainly depend on social media or peer networks for vaccine-related information are much more likely to develop vaccine hesitancy compared to families who regularly consult trained healthcare workers. Misinformation about vaccine safety, infertility, serious side effects and government plans often spreads online and once accepted in the community is hard to fight. These rumors are also reinforced by the deep mistrust of state institutions and public health programs in many marginalized and minority communities. History of exclusion, lack of access to health services and lack of communication with authorities can make individuals more distrustful of the government's vaccination program. Consequently, the risks of misinformation and mistrust in history result in several rural pockets of high vaccine hesitancy in Bihar.

3 The Frontline Cadre: Roles and Structural Interventions of CHWs

Bihar's public health system has adopted a reliance on Community Health Workers (CHWs), building trust between the community and health care services, to combat vaccine hesitancy. CHWs are generally community members who spend their entire time in the villages that they serve, rather than external health workers who come in occasionally. They have a good understanding of the local customs, languages, social relationships and cultural beliefs enabling them to communicate better with families. They are trusted and familiar community members who can serve as a good source to respond to concerns, combat misinformation, and promote vaccine acceptance. This close relationship allows CHWs to access local social and political systems that others may not have the skills to navigate, and makes them a vital component of efforts to enhance immunization coverage in rural Bihar Fig. 1.

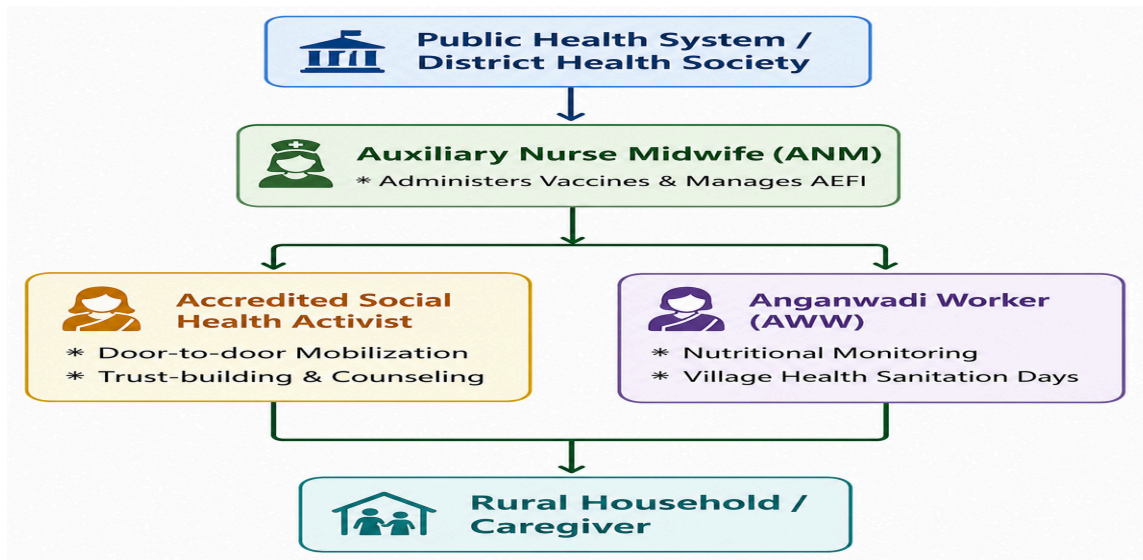


Figure 1: Public Health System Flowchart to Rural Households

3.1 Door-to-Door Interpersonal Counseling

One of the most effective approaches used by the best strategy that ASHA workers apply to combat vaccine hesitancy is to reach out to families in their homes as soon as possible, face-to-face. ASHAs are trusted members of the community and frequently visit households, and actively look for pregnant women and newborn children, and closely monitor their immunization status. If they are approached by families that are unsure or hesitant about getting vaccinated, they are not counting on just one conversation. Instead, they engage in repeated discussions, patiently listening to concerns, answering questions, and providing reassurance about the safety and benefits of vaccines [5].

Since ASHA workers are culturally, linguistically and existentially similar to the families they provide services to, they establish trust and familiarity. This personal contact gives them the opportunity to better tackle fears and misconceptions than outside health professionals. ASHAs assist families to make informed decisions and build confidence in their choices, which helps to neutralize the rumors, social pressures and misinformation that can plague families. This is an important way in which they can encourage healthy behaviors and enhance immunization rates in the rural setting.

3.2 Community-Led Innovations: The Routine Immunization Flipbook

Though public health workers in Bihar have found that it's not enough to just explain to parents that vaccines are safe; they need to address long-standing fears and family traditions. Many families in East Champaran have an inter-generational distrust of vaccination. To mitigate this, recent efforts have created hands-on tools, like the ASHA Routine Immunization Flipbook [6]. Traditionally, ASHA workers had a lot of work to do, and little time to spend on detailed counseling. Consequently, many contacts with families were brief and consisted of, "Please visit the clinic tomorrow for your child's immunizations." These brief exchanges were more about parents' concerns, but did not adequately explore questions of vaccine safety and side effects [6]. The new flipbooks will be used for more meaningful discussions. Simple illustrations and locally relevant examples are used to each page, and talking points for ASHA workers, in their own language, are given on the back of the page. This enables them to communicate the benefits of vaccinations, details a vaccination schedule, and provides reassurance to parents and caregivers about potential side effects, which are typically minor

complications such as mild fever or swelling. ASHAs will now have a simple and comprehensive guide to help them access health information more easily and reassuringly for families, and not just from memory, during their long home visits [6].

3.3 Microplanning and the Pulse Polio Infrastructure

India's polio eradication programme was a valuable example of overcoming vaccine hesitancy and enhancing immunization coverage in the country. The approaches that emerged from this battle against polio have shown how important community-based health workers are in accessing families, building trust and ensuring that no child is left behind. These learning experiences are continued by the District Health Societies of Bihar, who continue to apply a similar planning process in regular immunization rounds, special immunization programmes, and during public health emergencies [7]. A crucial component of this is the identification of remote villages, hard-to-reach settlements and socially excluded communities where children could be vulnerable to not receiving vaccinations. The Community Health Workers (CHWs) such as ASHAs and others working on the front line undertake surveys of households and ensure that accurate records are kept on the children who are not vaccinated or do not receive the vaccines at the appropriate time. Regular visits to homes and the updating of information at the community level enable health authorities to be aware of where there are gaps in immunization and ensure that vaccination services are organized based on local needs [5].

In this way health workers can communicate better with vulnerable families, plan for particular immunization sessions and provide individual support to caregivers; this process is systematic and community based. In this way, CHWs are playing an important role in the vaccination drive in rural Bihar, even in the most neglected areas.

4. Quantitative and Qualitative Impacts of CHW Engagement

The progress made in the vaccination coverage has been impressive and the participation of the community health workers at the grassroot level is an important factor. ASHAs, ANMs and other first-line health workers have over the years facilitated and supported families to understand the importance of vaccines and access of immunization services. UNICEF [1] states that increased utilization of women health workers, involving them in influencing vaccinations, and close collaboration with community have helped Bihar's immunization coverage level increase from 12 percent to 84 percent in 10 years. This excellent accomplishment is related to a long-term process of community participation and trust that can contribute to improved population health. The case of Bihar is a clear example that networks such as ASHA/ANM are not just about providing health services, but they are a powerful tool for change and can contribute to improvements in health behavior of families, and help increase access of children to life-saving vaccines.

4.1 Comparative Regional Case Studies

Bringing the vaccination rate to a higher level in Bihar is being achieved with consistent effort and commitment from the community health workers who serve a significant number of rural citizens in this state. Many families consider the first and best source of information about their health to be their ASHAs and ANMs. They are taking steps to inform parents about the importance of immunization and helping their children to stay protected from preventable diseases through consistent home visiting, community meetings and face-to-face interactions. As demonstrated in a recent study by UNICEF [1], these actions have led to really inspiring results. It has found that women health workers can increase the immunity rate from 12 percent to 84 percent within a period of 10 years by engaging with the

communities and participate in their vaccination drive planning in Bihar. This was not only due to improvements in health services, but to many years of trust, regular communication and close working relationships with local communities. The success of ASHA organizations and ANM in Bihar proves that they are not just delivering healthcare services. They are trusted guides, educators, and advocates for families and communities that help to heal communities with a feeling of fear, misinformation, and social barriers in their way. Their role is significant in shaping behaviors, in raising awareness and ensuring that more children have access to life-saving protection from vaccines.

4.2 Localized Impact Analysis

Let's take a closer look at community health worker activity at the village level and how it really does make a difference. Although studies are ongoing, targeted rural immunization campaigns have established that patient counselling, frequent home visits and follow-up efforts could improve uptake among vaccine hesitant families. ASHAs do not necessarily expect immediate acceptance, but take time to engage with families and address concerns in the process. During one such campaign, health workers surveyed door-to-door to find children that had not received any vaccines or may have not finished vaccination schedules. Initially 1801 children were identified as unvaccinated or partially vaccinated. During the first round of the campaign, 1,253 children were vaccinated in the community through individual counselling and community outreach by the local ASHAs. In the second round, the number rose to 1,268 and in the third round, to 1,394 [5]. These findings show that vaccine hesitancy is not an impenetrable obstacle. For many parents the answer is to simply provide them with the correct information, reassure them and remain supportive of them. Successful campaigns demonstrate the importance of continuing to engage communities and the effectiveness of trusted health workers on the front line to reach even the most hesitant and difficult-to-reach families.

5 Systemic Barriers and Operational Vulnerabilities Restricting CHW Efficacy

While there is clear empirical success, rural Bihar's institutional framework that supports CHWs is vulnerable to several aspects that weaken their ability to systematically address vaccine hesitancy.

5.1 The Structural Overutilization of ASHA Workers

Since the start of the National Rural Health Mission (NRHM), the duties of ASHA workers in Bihar have grown enormously. Today, an average of about 1,241 people is served by a single ASHA worker, which is higher than the national average of 979 people per ASHA worker [6]. Besides playing a role in the immunization program, the ASHAs are expected to undertake a variety of health-related tasks. They encompass maternal and child healthcare, antenatal care, nutrition monitoring, disease surveillance, health awareness activities, epidemic response, and involvement in special campaigns like polio drives [1][6]. Therefore, they are often forced to juggle many activities for limited time and resources. ASHAs often have a heavy workload, making it challenging to spend adequate time with each family. Many are tasked with giving brief reminders when visiting households rather than detailed discussion about vaccine safety and addressing parents' concerns. These activities can help keep families engaged, but with limited time, opportunities for them to accept the vaccine may be restricted, which can hinder opportunities to build trust and provide individualized counseling [6].

5.2 Severe Gaps in Standardized Refresher Training

However, the ability of grassroots health workers to be effective at challenging sophisticated digital misinformation or entrenched cultural concerns is often limited by systemic institutional inertia around

their continuous learning. In rural areas, there are many active ASHA workers who have not taken any formal, compulsory refresher training course for several years [6].

As a result, they have developed strategies over the years that have been successful in ensuring vaccines are delivered, but their understanding of the intricacies of vaccine technologies, their local immune benefits, and the changing vaccine agendas can become weak [6]. This results in their being more vulnerable when it comes to responding with confidence to complex parent questioning.

5.3 Role Ambiguity and Communication Breakdowns

A major problem in the immunization system in rural Bihar is the mismatch of responsibilities and capacities of various types of Community Health Workers (CHWs). Auxiliary Nurse Midwives (ANMs) are trained health-care workers who provide technical health advice and administer vaccines and address side effects. They span multiple villages in expansive geographic areas and cannot be sustained in a single village long enough to offer ongoing follow-up services to families [4]. Unlike ASHA workers, Anganwadi Workers (AWWs) are residents of the community and are the first people to whom families seek advice and support when their child develops a fever, swelling, and/or discomfort following vaccination. They are familiar and accessible to parents who seek their advice and reassurance. While keeping frontline workers well-trained in handling vaccine-related side effects, they are not always trained, trained adequately, or provided with simple medicines to allow families to manage common post-vaccination symptoms, like Paracetamol [4]. This can be challenging if parents feel they need to get help right away and they don't get direction. Families may become frustrated and lose faith in the vaccination process if their child experiences side effects and is not followed up medically. Sadly, this frustration is sometimes channeled towards the local ASHAs and AWWs but they may not have the resources and/or authority to solve the problem completely. These experiences can undermine the confidence that community members have in the health care system, cause discord among frontline health workers, and lead to some families declining future vaccines for their children [4].

6 Strategic Recommendations for Policy and Infrastructure Optimization

Specific changes to the health system in Bihar are required to further strengthen CHWs' capacity to address vaccine hesitancy in rural communities. Community Health Workers can be empowered to respond to community needs, develop trust with the community, and help more children get timely vaccinations by having access to improved training, resources, supportive supervision and manageable workloads.

6.1. Institution of Continuous, Decentralized Training Frameworks

The state and district health authorities should go beyond the one-time training for Community Health Workers (CHWs) and implement regular refresher training sessions at the block level to enhance their capacity to deal with vaccine hesitancy. Continuous education opportunities to update CHWs on new health concerns and improve interactions with families.

These training programmes should not only contain didactic material but also practical, such as communicating in a caring manner with parents, managing concerns and coping with misinformation on social media, providing basic information on common vaccination side effects in an easy-to-understand and reassuring way. CHWs knowledgeable and confident in their knowledge can better answer family questions, demonstrate trust with families and assist them in decisions regarding healthcare.

The healthcare system can build trust in the credibility of CHWs by providing continuous training and support, so that CHWs can remain trusted leaders of health information for their communities.

6.2. Standardization and Universal Supply of Visual Counseling Aids

Simple, low-cost innovations such as the ASHA Routine Immunization Flipbook can be powerful tools in building vaccine awareness and acceptance. These visual aids help health workers convey complex health information in more understandable, memorable, and motivating ways, making conversation about immunization more effective. The Bihar Department of Health should strive to expand this achievement; ensuring that these flipbooks and other user-friendly tools for child tracking, like the Shishu Suraksha Card, are available in every district of Bihar. Health workers benefit from clear and standardized educational materials, which can help to ensure that there is a high quality and consistency in the information that is shared with families. These can be particularly helpful for ASHAs and other first-line responders who have a lot of work and a large population to deal with. They can confidently and effectively share key health messages with the use of visual tools and easy tracking systems. This helps to alleviate the health workers' burden and ensures that all families have access to accurate, understandable and reliable information on childhood immunization.

6.3. Formal Integration of Localized AEFI Response Toolkits

The primary reason for vaccine hesitancy is fear of vaccine side effects, which needs to be addressed by increasing the legal and material support for ASHAs. Regular training and a legislative directive to ensure ASHAs are able to proactively distribute basic non-prescription pediatric fever medicines (such as Paracetamol drops) to caregivers, straight after vaccination. Meanwhile, there should be secure mobile communication linkages between village ASHAs and block ANMs. This helps to provide rapid clinical response to any reported high fevers or unusual localized swelling to ease community fears and prevent vaccine refusal from becoming widespread.

6.4. Structural Realignment of Workloads and Incentive Models

District health strategies need to rebalance the load of individual ASHA workers to reduce the risk of 'burnout' and the hectic home visits resulting from overutilization [6]. This can be done by hiring more staff to decrease average catchment sizes to the target of 1000 people. Additionally, health systems should isolate administrative reporting duties from direct, face-to-face counselling jobs. Last but not least, instead of one-time incentives, higher and sustainable minimum payments should increase retention, improve morale, and provide ASHAs with greater stability to engage in very focussed and trust-building interactions with highly skeptical families.

Conclusion

In rural Bihar, the backbone of health care delivery is Community Health Workers (CHWs). They know the local languages, customs and social realities as a part of the community they serve, and are able to establish good relationships with families. ASHAs, ANMs, and Anganwadi Workers have made significant contributions to improving immunization rates and promoting health practices in the state through their regular home visits, health education, and outreach in the community. While these accomplishments have been made, vaccination hesitancy still remains a large problem. A lack of understanding among parents along with concerns about potential vaccine side effects and misinformation from community and social media sources persists. This can lead to fear and uncertainty amongst parents, which can make some parents to not want to vaccinate their children. As discussed above, the literature that was reviewed in this study suggests that CHWs have the potential to overcome these barriers since they establish trust with the communities they serve. They are often unable to work effectively due to excessive workload, refresher training problems, and may fail to provide resources for families who

experience typical post-vaccination side effects in their children. Systems can be improved through regular training, support, visual communication and adequate resources.

So, investing in Community Health Workers is an investment in the health workforce but also the health and well-being of the rural populations. Providing them with knowledge and tools and providing them support will help them further decrease vaccine hesitancy and take baby steps on the path of ensuring vaccine protection for every child at an opportune time in Bihar.

References

1. UNICEF. (2024). Leadership of frontline health workers in breaking gender barriers using digital platforms during the COVID-19 immunization drive. UNICEF Case Study Series. <https://www.unicef.org/media/166221/file/en-case-study-leadership-female-healthworkers-India-2024.pdf.pdf>
2. Ranjan, A., Pandey, S., Singh, C. M., Kumar, P., Ahmad, S., & Agrawal, N. (2019). Socio-demographic determinants of childhood immunization coverage in rural population of Bhojpur district of Bihar, India. *Journal of Family Medicine and Primary Care*, 8(8), 2484–2489. https://doi.org/10.4103/jfmpc.jfmpc_356_19
3. Sharan, S. (2025). Assessment of vaccine hesitancy and its predictors among parents of under-five children in semi-urban areas: A mixed-methods approach. *Journal of Heart Valve Disease*, 34(2), 112–120.
4. Dhaliwal, B. K., Chandrashekhar, R., Rattani, A., Seth, R., Closser, S., Jain, A., Bloom, D. E., & Shet, A. (2020). Community perceptions of vaccination among influential stakeholders: Qualitative research in rural India. Cold Spring Harbor Laboratory. <https://doi.org/10.1101/2020.12.04.20244228>
5. Immunization Technical Support Unit [ITSU]. (2024). Health workers (ANMs, ASHAs, AWWs, MAS). Ministry of Health and Family Welfare, Government of India. <https://itsu.org.in/health-workers/>
6. Gavi. (2026). Why children were missing out on routine vaccines, and how listening helped to close the gap. VaccinesWork. <https://www.gavi.org/vaccineswork/why-children-were-missing-out-routine-vaccines-and-how-listening-helped-close-gap>
7. World Health Organization [WHO]. (2021). How to vaccinate 95% people in 2 days, the Bankatwa way. WHO India Feature Stories. <https://www.who.int/india/news-room/feature-stories/detail/how-to-vaccinate-95-people-in-2-days-the-bankatwa-way>